Lymphology 40 (2007) 138-142

MANUAL LYMPH DRAINAGE EFFICIENTLY REDUCES POSTOPERATIVE FACIAL SWELLING AND DISCOMFORT AFTER REMOVAL OF IMPACTED THIRD MOLARS

G. Szolnoky, K. Szendi-Horváth, L. Seres, K. Boda, L. Kemény

Departments of Dermatology and Allergology (Phlebo-Lymphology and Wound Care Unit) (GS,LK), Dentistry and Oral Surgery (LS), and Medical Informatics (KB), University of Szeged, and Department of Physiotherapy (KS-H), Istvan Bugyi County Hospital, Szentes, Hungary

ABSTRACT

The removal of wisdom teeth is often associated with severe postoperative edema and pain, and operation on the third molar can cause local inflammation that impairs lymph transport. The objective of the study was to assess the efficacy of manual lymph drainage (MLD) in reducing swelling following bilateral wisdom tooth removal. Ten consecutive patients with bilateral impacted wisdom teeth that required surgical removal were enrolled in the study. Each patient was postoperatively treated with MLD (after Vodder's method) on one side of the neck region with the untreated contralateral side as a control. Swelling was evaluated using a tape-measure placed in contact with the skin. The six landmarks of measurement included tragus-lip junction, tragus-pogonion, mandibular angle-external corner of eye, mandibular angle-ala nasi, mandibular angle-lip junction, and mandibular angle-median point of chin. Subjective assessment of MLD was conducted with self-evaluation using a visual analogue bar scale (VAS, range 0-100 mm). Of the 6 linear measurements, 4 lines (2, 4, 5, 6) showed a significant reduction of swelling on the side of MLD compared to the untreated side. Mean score of VAS of pretreatment condition was 35.5 ± 20.60 mm that decreased to 22 ± 19.32 mm measured after MLD (p=0.0295). This initial study demonstrates that MLD may promote an improvement of lymph circulation and work in an adjunctive role for reduction of postoperative swelling and pain following removal of impacted third molars.

Keywords: wisdom tooth, operation, pain, swelling, manual lymph drainage

Wisdom tooth removal is a commonly undertaken procedure which is necessary when the jaws are not large enough to accommodate the wisdom teeth or the wisdom teeth are lying in a poor position (1). Removal of third molars can vary greatly in difficulty, some being very straightforward, others being difficult and requiring surgical intervention. Following the procedure, patients develop pain and swelling associated with the surgical sites, and this is variable from person to person without apparent reason. The extent and difficulty of operation are also variables (2), and there have been some attempts to predict pain and swelling based on preoperative conditions (3).

Postoperative edema and pain can be alleviated via a wide variety of local and systemic treatments. Local cooling with ice-packs is the most common postoperative care to minimize swelling, although no evidence supports its usage (4). Non-steroid anti-inflammatory drugs have been shown

to efficiently reduce pain and inflammation (5-9) while application of antibiotics (prophylaxis or treatment) provides a reliable infection control (6). Removal of wisdom teeth and other oral surgery procedures may cause rapidly evolving, severe edema and sometimes hardly bearable pain as the consequence of post-traumatic inflammation (3). Any kind of surgical intervention can play a role as a dynamic factor in the development of local lymphatic insufficiency causing lymphatic vessels to be temporarily unable to cope with excessive amount of lymph. This aspect of inflammation raised the need for a method that would enhance lymphatic transport capacity. Manual lymph drainage (MLD) is a gentle massage technique that improves lymph flow, microcirculation and tissue oxygenation, and reduces edema and pain (10). It is applicable to any area of the body and various forms of edema including head and neck swelling. In this region, encephalopathy with lymph stasis, cervical post-traumatic lymphedema, post-traumatic increased intracranial pressure, and surgery-associated swelling are all candidates for MLD (10). So far, evidence proving its efficacy has not been published. The aim of this study was to investigate whether the application of MLD in the case of third molar extraction can efficiently diminish postoperative pain and swelling. One of the greatest obstacles for a precise, reliable and objective demonstration of the characteristics of a drug or a technique is the difficulty in volume-reduction assessment. Although numerous methods have been tried, some have been shown to lack sensitivity, and others are laborious and not applicable from the operative standard point (11-14). A new objective method using linear measurements has recently been published to allow precise detection and monitoring of changes in facial swelling (15).

PATIENTS AND METHODS

Ten consecutive patients with bilateral impacted wisdom teeth that required surgical removal entered the study. All third molar teeth were partially or completely covered by mucosa and cortical bone. All patients had the right and left sided wisdom teeth in the same position so the planned surgical procedure was the same on both sides. Patients signed a written informed consent approved by the Ethical Committee of the University of Szeged. Exclusion criteria included facial or neck inflammatory skin diseases, carotis sinus hyperaesthesia, hyperthyroidism, and patients who rejected unilateral MLD as a part of post-operative treatment. Position of impacted teeth was visualized with X-ray examination. Patients were not given pre-operative antibiotic treatment. Male/female ratio was 7/3 and the mean age was 21 years (14-27 years). Each patient underwent bilateral removal of the third molar teeth. The same surgeon performed the procedures on the left and the right side. Three patients had both upper and lower, while 7 had only lower wisdom tooth removal. Briefly, surgical intervention occurred as follows (16). All operations were performed under general anaesthesia. Mucoperiosteal flap was reflected from the mesial corner of the first molar distally to the retromolar region. Bone was removed with a water-cooled round burr. In four patients, both lower teeth were sectioned with fissure bur. The socket was irrigated with sterile physiological salt solution. A 4-0 resorbable suture was used to close the wound. One suture was placed interdentally between the first and second molars, and two stitches were used to close the distal part of incision. No penicillin or diclofenac allergy was reported, therefore patients received 375 mg oral amoxicillin/clavulanic acid three times daily for 5 days and 50 mg oral diclofenac three times daily for three days.

Each patient was treated unilaterally in the neck region using Vodder's method as described elsewhere (10). The side of MLD was decided by randomization. Each patient served as his own control, hence the untreated

TABLE
Measurement of Anatomic Landmarks of the Face Prior to Operation, Postoperatively Before and after the Full Course of MLD. Results are Displayed as Mean Data±SD

		Day 0 (Prior to oral surgery)	Day 1 (Surgical intervention)	Day 6 (End of physiotherapy)	Difference Pre- Post-Treatment	p
Line 1 (cm) (tragus-lip junction)	Treated	9.39±0.59	10±1.06	9.56±0.71	0.44±0.72	n.s.
	Untreated	9.53±0.66	9.59±0.48	9.33±0.46	0.26±0.37	
Line 2 (cm) (tragus-pogonion)	Treated	9.92±0.80	10.83±1.10	10.17±0.87	0.66±0.41	0.049
	Untreated	9.64±1.15	10.38±0.53	10.09±0.45	0.29±0.52	
Line 3 (cm) (mandibular angle-eye external corner)	Treated	8.1±0.60	9.01±1.01	8.21±0.57	0.80±0.85	0.054
	Untreated	8.02±0.86	8.69±0.83	8.31±0.64	0.38±0.49	
Line 4 (cm) (mandibular angle-ala nasi)	Treated	10.43±0.59	11.23±0.96	10.58±0.89	0.65±0.56	0.049
	Untreated	10.37±1.25	10.79±1.29	10.64±0.89	0.15±0.92	
Line 5 (cm) (mandibular angle-lip junction)	Treated	10.70±0.69	11.33±0.64	10.58±0.91	0.42±0.34	0.029
	Untreated	10.68±0.73	11.15±0.90	11.06±0.76	0.09±0.36	
Line 6 (cm) (mandibular angle median point of chin)	Treated	14.50±0.80	15.31±0.94	14.57±0.81	0.74±0.50	0.016
	Untreated	14.64±1.81	14.96±1.26	14.85±1.20	0.11±0.58	

side was appropriate for comparison. 30-min MLD was carried out once daily in the first, second and third postoperative day. Evaluation of the therapy was scheduled to the sixth postoperative day, when sutures were completely removed.

Swelling was evaluated with the objective method using a tape-measure graduated in millimeters, placed in contact with the skin. The six landmarks of measurement were as follows: tragus-lip junction, tragus-pogonion, mandibular angle-external corner of eye, mandibular angle-ala nasi, mandibular angle-lip junction, mandibular angle-median point of chin. The previously described method of measurement was accomplished prior to operation, on the first and sixth postoperative day. Subjective assessment of MLD based on change in pain and general discomfort was assessed with self-evaluation using a 100-mm-length bar for the representation of visual analogue scale (VAS) on the first and sixth postoperative day. 0 reflected a painless state, and 100 corresponded to intense, unbearable pain (15).

Statistical Analysis

Distances at preoperative, onset stage were not considered. The change between postsurgical conditions was calculated at each side. A one-tailed paired t-test was used to examine whether the mean change at the MLD-treated side was significantly greater than the change at the control side.

RESULTS

The self-assessment of pain using VAS for pretreatment condition was 35.5 ± 20.60 mm which decreased to 22 ± 19.32 mm measured after the full-course of MLD ($p=0.029$). This finding reflected a significantly improved quality of life within the study group (patients 6, 8 and 9 demonstrated no difference before and after MLD). The *Table* shows the alteration of distances between the examined anatomic sites. Of the 6 linear measurements, two landmarks failed to demonstrate a significant reduction of swelling on the side of MLD compared to untreated, control side (line 1 and just not significant line 3). All other lines (2, 4, 5, 6) demonstrated a significant difference.

DISCUSSION

Previous studies have shown that the use of corticosteroids, non-steroidal antiinflammatory drugs, and antibiotics after wisdom-tooth removal may contribute to decreased swelling and pain, and some of these methods could exert a synergistic effect. Emerging cases of drug-allergy and drug-associated side effects are focusing more attention on alternative methods (17). In a preliminary study, local cryotherapy after third molar extraction seemed to lower severe consequences such as swelling and pain. Despite the fact that ice-packs are widely used for inflammation- and trauma-related edema reduction, no strong evidence supports their application.

It is well-known that operation and traumatic injuries alter lymph circulation causing local edema usually by inflammation promoting a dynamic insufficiency component of lymphedema. Mechanical causes can also occur when transport capacity is affected from complete or incomplete blockade of lymph vessels. MLD patterned after Vodder has been indicated for the head and neck region in the case of neoplastic or cancer treatment-related lymphedemas, and we have also shown the beneficial effect of MLD in the “trapdoor phenomenon” of facial subcutaneous pedicle flaps (18). MLD is thought to increase transport capacity of lymph vessels by raising the lymphangiomotor activity and stimulating lymph nodes to further improve lymph transport.

The availability of a value to quantify swelling in an objective and repeatable fashion has long been a goal of research, especially in dentistry or oral surgery in order to evaluate the efficacy of a drug and to obtain data for comparison studies. The

simplest methods, which entail having the patient or physician compile VAS, are highly influenced by the subjective nature of visual evaluation. Although numerous methods have been devised to provide objective measurement of facial swelling, some are imprecise, and others more complex, expensive, and difficult to standardize (11-14). The present study used the method of linear measurement originally tested in facial abscesses to more precisely quantify the changes in facial volume (15). This method provided a series of data points utilizing defined landmarks.

This study using reproducible facial measurements and a VAS pain scale has demonstrated that a significant reduction in facial swelling and pain can be obtained using MLD after removal of impacted third molars.

REFERENCES

1. Conrad, S, GH Blakey, DA Shugars, et al: Patients' perception of recovery after third molar surgery. J. Oral. Maxillofac. Surg. 57 (1999), 1288-1294.
2. Renton, T, N Smeeton, M McGurk: Factors predictive of difficulty of of mandibular third molar surgery. Br. Dent. J. 190 (2001), 607-610.
3. Yuasa, H, M Sugiura: Clinical postoperative findings after removal of impacted mandibular third molars: prediction of postoperative facial swelling and pain based on preoperative variables. Br. J. Oral. Maxillofac. Surg. 42 (2004), 209-214.
4. van der Westhuijzen, AJ, PJ Becker, J Morkel, et al: A randomized observer blind comparison of bilateral facial ice pack therapy with no ice therapy following third molar surgery. Int. J. Oral. Maxillofac. Surg. 34 (2005), 281-286.
5. Bamgbose, BO, JA Akinwande, WL Adeyemo, et al: Effects of co-administered dexamethasone and diclofenac potassium on pain, swelling and trismus following third molar surgery. Head Face Med. 1 (2005), 11.
6. Graziani, F, L Corsi, M Fornai, et al: Clinical evaluation of piroxicam-FDDF and azithromycin in the prevention of complications associated with impacted lower third molar extraction. Pharmacol. Res. 52 (2005), 485-490.
7. Bjornsson, GA, HR Haanes, LA Skoglund: A randomized, double-blind crossover trial of paracetamol 1000 mg four times daily vs ibuprofen 600 mg: Effect on swelling and other postoperative events after third molar surgery. Br. J. Clin. Pharmacol. 55 (2003), 405-412.
8. Amin, MM, DM Laskin: Prophylactic use of indomethacin for prevention of postsurgical complications after removal of impacted third molars. Oral. Surg. Oral Med. Oral Pathol. 55 (1983), 448-451.
9. Schultze-Mosgau, S, R Schmelzeisen, JC Frolich, et al: Use of ibuprofen and methylprednisolone for the prevention of pain and swelling after removal of impacted third molars. J. Oral Maxillofac. Surg. 53 (1995), 2-7.
10. Földi, M, S Kubik: *Textbook of Lymphology*. Urban & Fischer 2002. pp 532-537.
11. Van Gool, AV, JJT Bosch, G Boreing: A photographic method of assessing swelling following third molar removal. Int. J. Oral Surg. 4 (1975), 121-129.
12. Milles, M, PJ Desjardins, HE Pawel: The facial plethismograph: A new instrument to measure facial swelling volumetrically. J. Oral Maxillofac. Surg. 43 (1985), 346-352.
13. Burke, PH: The accuracy and range of certain stereophotographic measurement of facial morphology. Trans. Eur. Orthod. Soc. (1972), 543-553.
14. Bjorn, H, C Lundquist, CE Hjelmstrom: A photogrammetric method of measuring the volume of facial swelling. J. Dent. Res. 33 (1954), 295.
15. Montebugnoli, L, D Servidio, RA Miaton, et al: An objective method of assessing facial swelling in patients with dental abscesses treated with clarithromycin. Min. Stomatol. 53 (2004), 263-271.
16. Rakprasitkul, S, V Pairuchvej: Mandibular third molar surgery with primary closure and tube drain. Int. J. Oral. Maxillofac. Surg. 26 (1997), 187-190.
17. Laureano Filho, JR, ED de Oliveira e Silva, CI Batista, et al: The influence of cryotherapy on reduction of swelling, pain and trismus after third-molar extraction: a preliminary study. J. Am. Dent. Assoc. 136 (2005), 774-778.
18. Szolnoky, G, G Mohos, A Dobozy, L Kemeny: Manual lymph drainage reduces trapdoor effect in subcutaneous island pedicle flaps. Int. J. Dermatol. 45 (2006), 1468-70.

Gyozo Szolnoky, MD, PhD
Department of Dermatology and Allergology
University of Szeged
P.O. BOX 427
H-6720 Szeged, Hungary
Tel: 36-20-326-6161
Fax: 36-62-545954
Email:
szolnoky@mail.derma.szote.u-szeged.hu